Progress Report on NOAA-SARP Project "An Assessment of the Hydrologic Vulnerability of the Missouri River Basin to Climate Variability at Interannual to Decadal Timescales" – NA06OAR43100681

Period of performance: 1 May 2006 – 31 December 2006

Recruitment of a Research Assistant for this project:

Ms. Katherin Kullgren was recruited to work as a Research Assistant on this project from a field of ten candidates. Ms. Kullgren has an M.S. in Meteorology from Florida State University.

Advisory Committee meeting:

As a first step in initiating the research, a multidisciplinary Advisory Committee composed of experts specializing in various aspects of the MRB hydrologic variability and its economic impacts, has been recruited to advise the investigators. The Committee consists of Dr. Michael Hayes (National Drought Mitigation Center, University of Nebraska - Lincoln), Mr. Steve McIntosh (Water Resources Program, Missouri Department of Natural Resources), and Professor Eric Wood (Princeton University). Dr. Robert Hearne (Department of Agribusiness and Applied Economics, North Dakota State University) has been recruited as a consultant. Dr. Hearne guides the research team in the economic impacts component of the proposed research. The Army Corps of Engineers – Institute for Water Resources's interest in this NOAA-SARP project motivated it to become a partner with an additional set of tasks to be performed in collaboration with this project. Dr. Rolf Olsen is the PI of the additional tasks.

The Advisory Committee met all investigators and the consultant in a two-day meeting at the CRCES office in Columbia, Maryland on 24-25 July 2006 to discuss the project and devise the final work plan. The SARP Program Manager, Dr. Nancy Beller-Simms, was briefed by this group about the final work plan on the second day of the meeting.

Project Tasks:

Task 1: Diagnoses of Hydro-meteorological Variability

Using the very high resolution ($1/8^o$ in space, 3 hours in time) and long time span (1950-2000) Maurer et al. (2002) data set containing observed precipitation, surface air temperature, surface wind speed, and relative humidity; and stream flow data from the U.S. Geological Survey gauges, we have identified impacts of major climate phenomena on the Missouri river basin (MRB) hydro-meteorology. We find that the Pacific Decadal Oscillation (PDO), the tropical Atlantic sea-surface temperature variability at decadal timescale, and the Indo-Pacific Warm Pool SST variability at decadal timescale make the largest impacts on the MRB hydro-meteorology in summer, the main rainy season in the MRB. The 1950s droughts were primarily associated with the negative phase of the PDO, the late 1980s droughts were primarily associated with the negative phase of the tropical Atlantic SST gradient, and the mid-to-late 1990s floods were primarily associated with the positive phase of the PDO. These and other results will be published as a CRCES Report and as a peer-reviewed paper in a journal. Some of the major results are shown in the accompanying Powerpoint presentation.

Task 2: Elicitation of Societal Impacts Indicators

Based on the discussions in the Advisory Committee meeting in July 2006, a pilot elicitation project was devised in Nebraska to meet stake-holders and policy-makers to elicit their views on impacts of interannual to decadal climate variability on the MRB water availability. Individual and group meetings were organized by the National Drought Mitigation Center in eastern and central Nebraska and western Iowa. The PIs were accompanied by NDMC scientists in these meetings. An information hand-out about

decadal climate "cycles", containing some of the major results from Task 1 and other information, and an elicitation questionnaire were prepared and distributed to the approximately 30 interviewees. All interviewees were very much interested in this research and are willing to help in this and future such projects. Thus, a network of stake-holders and policy-makers in the MRB is being assembled as a part of this project. The discussions with these interviewees are summarized in the accompanying Powerpoint presentation. A CRCES Report and a peer-reviewed journal article are being prepared the pilot elicitation project.

Task 3: Hydrologic, Crop Yield, and Water Use Modeling

Ms. Katherin Kullgren has been trained to run experiments with the HUMUS hydrologic model and the EPIC crop model by Dr. Rosenberg and by the University of Texas group which originally developed these models. Ms. Kullgren has made test runs of these models and actual experiments for this project will soon be started. These models have been installed and run on workstations in CRCES.

Thus, the project team is well on the way to achieving first year's objectives.